**MICRO CASE 11: Mycoplasma pneumoniae**

1. **SIGNS AND SYMPTOMS FOR THE DISEASE IT PRODUCES.** 
   1. Fever
   2. Headache
   3. Progressively dry cough
   4. Clear sputum
   5. Brother had had similar symptoms 2 weeks earlier
   6. Physical exam
      1. appeared slightly pale
      2. **Mild pharyngeal erythema** was noted with **minimal cervical adenopathy but no exudates**.
   7. Chest x ray—bilateral patchy infiltrates
   8. ***The four most important characteristics of atypical pneumonia are*** 
      1. 1. nonproductive cough
      2. 2. variable chest x-ray (patchy, diffuse infiltrates)
      3. 3. no bacteria on smear
      4. 4. no response to β-lactam antibiotics
2. **THE SOURCE OF INFECTIOUS ORGANISM.** 
   1. Mycoplasma pneumoniae (primary atypical, or “walking,” pneumonia)
      Elsevier Health.
3. **THE MANNER OF EXPOSURE, ROUTE OF INFECTION, TISSUES THAT THEY RESIDE AND, WHERE APPROPRIATE, TRANSMISSION TO OTHERS.** 
   1. person-to-person transmission
      1. inhalation of
         aerosol particles
      2. contact with respiratory secretions from someone with the infection
   2. These bacteria bypass the URT because they are so small and deposit in the LRT
4. **THE PATHOLOGY AND THE MANNER BY WHICH THE PARTICULAR DISEASE DEVELOPS AND/OR IS INDUCED, INCLUDING DAMAGE CAUSED BY THE PATHOGEN AND DAMAGE CAUSED BY THE IMMUNE SYSTEM’S RESPONSE TO THE PATHOGEN.** 
   1. Because mycoplasma pneumonia are so small they are able to bypass the upper airways and deposit in the lower respiratory tracts. The organisms have filamentous tips (flask-shaped appearance) that are complex, composed of adhesins, and adherence-accessory proteins. These proteins mobilize and concentrate adhesins at the tip and permit colonization of bacteria between cilia within the respiratory epithelium, probably through host sialoglycoconjugates and sulfated glycolipids. **Bacterial adherence leads to inhibition of ciliary movement (known as ciliostasis), resulting in the prolonged cough seen in this disease**. The organisms produce **hydrogen peroxide**, which is cytotoxic and is responsible for much of the
      initial cell disruption in the respiratory mucosa and, in uncommon cases, for damage to RBCs (hemolytic anemia). *M. pneumoniae stimulates T and B lymphocytes, inducing the formation of IgM autoantibodies, which react with a variety of host tissues, and antigen I on erythrocytes*. Cold agglutinin, detected by agglutination of type O Rh-negative erythrocytes at 4°C, may be present in the acute serum of 30% to 60% of patients.
   2. Other Clinical Features of Mycoplasma pneumoniae Infections
      1. Tracheobronchitis
         1. Symptomatic (80%) disease is typically mild and is characterized by nonproductive cough, fever, malaise, and pharyngitis.
      2. Extrapulmonary syndromes
         1. Less common complications include adult respiratory distress syndrome, pericarditis, myocarditis, hemolytic anemia (associated with cold agglutinin IgM), and encephalitis.
         2. Neurologic complications (e.g., myelitis, encephalitis) may occur in up to 10% of cases.
         3. Some young male patients develop extensive rash, involving the mucous membranes and large areas of the body, known as “erythema multiforme” (Stevens-Johnson syndrome).
         4. Fatal cases are reported occasionally, primarily among the elderly and persons with
            sickle-cell dz
5. **METHODS OF IDENTIFICATION AND PLACEMENT INTO A PARTICULAR BIOLOGICAL SUBSET.** 
   1. Mycoplasmas are the smallest free-living, self-replicating organism (0.2 to 2 μm in diameter).
   2. wall-less bacteria (no mucopolysaccharide cell wall) are bounded by a plasma membrane;
   3. Dont react to Gram stain.
   4. The three-layer **outer membrane contains cholesterol**.
6. **FACTORS LEADING TO ENHANCED RESISTANCE OR SUSCEPTIBILITY (E.G., RECIPIENTS OF VACCINES, RESIDENCE IN GEOGRAPHIC AREAS, TYPES OF WORK, IMMUNODEFICIENCY, ALCOHOLISM, AGE, VIOLENCE/ABUSE, RELIGIOUS BELIEVES, ETC.).** 
   1. M. pneumoniae is a common cause of acute upper and lower respiratory infection in children and young adults.
   2. M. pneumoniae accounts for 15% to 20% of community-acquired LRT infection in adults.
   3. Infections occur sporadically throughout the year,
   4. Household infections are often the result of contact with siblings or children. In families, cases occur serially, with 2- to 3-week intervals between cases.
   5. The general **risk age group is 5 to 20 years** (school age children to young adults).
   6. Outbreaks are common among young adults, especially in crowded military and institutional settings, where the outbreaks can last several months.
7. **OTHER ORGANISMS IN THE DIFFERENTIAL DIAGNOSIS AND HOW TO DISCRIMINATE AMONG POTENTIAL CAUSATIVE AGENTS.** 
   1. **DDx**
      1. Adenoviruses (ARDS)
      2. Chlamydia psittaci
      3. Chlamydophila pneumoniae
      4. Coxiella burnetii (Q fever)
      5. Influenza A and B
      6. Legionella pneumophila
         1. Legionella often causes gastrointestinal symptoms and a severe headache
      7. Mycoplasma pneumoniae
         1. Mycoplasma is unique in that clinical pulmonary findings are often absent.
      8. Streptococcus pneumoniae
         1. Truly purulent (pusy) sputum, as is seen in S. pneumoniae (a major cause of typical pneumonia), is not consistent with atypical pneumonia.
      9. There are many etiologies for atypical pneumonia, and they are often difficult to differentiate clinically.
         1. C. psittaci, Coxiella, and Legionella may have a specific history of exposure (e.g., birds, domestic animals, or environmental).
   2. **Test**
      1. Gram stain of respiratory specimen to differentiate atypical presentation from typical lobar presentation (i.e., pneumococcal pneumonia)
         1. Gram stain and cultures (can be grown with difficulty on *Eaton’s agar*) are not useful for identifying M. pneumoniae or any other atypical pathogen from sputum.
      2. Blood culture-- can be grown with difficulty on *Eaton’s agar*
      3. Serologic tests
         1. cold agglutination
         2. four-fold rise in IgG antibody titers between acute- and convalescent-phase serum specimens, ideally obtained 2 to 3 weeks apart may provide a retrospective diagnosis.
            1. Microorganism-specific IgG antibody response, although a retrospective diagnosis, is useful for confirmation of clinical diagnosis.
8. **PREVENTION, TREATMENT AND VACCINE DESIGN (LIVE VS. DEAD).** 
   1. **Treatment**
      1. **erythromycin** or **doxycycline** is the drug of choice.
      2. Cell-wall inhibitors (e.g., amoxicillin or cefotaxime) are ineffective against Mycoplasma, which are wall-less bacteria.
      3. Newer oral macrolides (e.g., clarithromycin or azithromycin) or fluoroquinolones (e.g., levofloxacin) are better tolerated than erythromycin and doxycycline and have comparable clinical efficacy against atypical pneumonia but are much **more expensive**.
      4. Therapy of confirmed primary atypical pneumonia is usually continued for 14 to 21 days, owing to relapses with shorter courses of treatment.
   2. **No vaccine**